In the Claims

Please cancel claim 32.

Remarks

Favorable reconsideration of this application is requested in view of the following remarks. For the reasons set forth below, Applicant respectfully submits that the claims are now allowable over the cited references.

The Final Office Action dated August 27, 2002 indicated that: the title of the invention was not descriptive; claims 28-32 and 34 stand rejected under 35 U.S.C.§112(1) as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention; claims 28-30 and 34 stand rejected under 35 U.S.C. §112(2) as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention; and claims 27-37 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Korman* (U.S. Patent No. 5,959,357) in view of *Green et al.* (U.S. Patent No. 4,851,895).

Applicant respectfully submits that the Examiner is applying improper hindsight in asserting that independent claim 27 is obvious under the rigorous requirements of §103(a) in view of the combination of asserted teachings, respectively provided by way of the *Korman* and *Green* references. As clearly set forth in the Background portion of Applicant's Specification (page 2, line 4 through page 4, line 5 as well as page 6, line 24 through page 7, line 3), the claimed invention is directed to a semiconductor device which permits use of an aluminum-based via for interconnecting metal portions while also inhibiting structural defects such as flux divergence and electromigration resistance degradation. This Background portion of Applicant's Specification explains that conventional metals used in this environment (such as tungsten) do not provide the same benefits as aluminum, and where attempts to implement aluminum vias have been made, semiconductor devices have suffered from the above-mentioned problems including flux divergence and electromigration resistance degradation.

The asserted prior art does not recognize these problems set forth in Applicant's Specification and, as acknowledged in the Office Action, fails to teach Applicant's device as

claimed. To be clear, the Office Action does not advance the argument that the asserted prior art either recognizes or addresses the problems discussed by Applicant when conventional metals are used in this environment. Rather, the Examiner has very carefully attempted to read independent claim 27 on the embodiment illustrated as figure 3 of the *Korman* '357 reference. This *Korman* '357 reference expressly indicates that the preferred material for its alleged corresponding via is not aluminum but rather is copper: each of layers 38, 40 and 42 (including the material for the alleged corresponding via) "are preferably copper" along with metal pad 22 and copper post 36. (*See*, col. 5, lines 4-51). Use of copper material for these interconnects, allegedly corresponding vias and pads, is directly associated with the purpose of the alleged invention of the *Korman* '357 reference; this purpose being "to provide a FET array employing high density interconnect (HDI)" to overcome disadvantages of device element interconnections including excellent electrical conductivity. (*See*, col. 3, lines 5-27). HDI circuits do not employ the type of aluminum-based via structure as asserted in the Office Action. Moreover, while the *Green* '895 reference may discuss various attributes of such available conductive metal materials, the *Korman* '357 reference prefers copper over such other conductive metal materials. Moreover, contrary to the suggestion in the Office Action, the *Green* '895 reference does not teach that copper and aluminum are interchangeable for either the above-discussed purpose of the *Korman* '357 reference or for problems addressed in Applicant's Specification.

With that understanding of the invention and the asserted prior art, Applicant respectfully submits that the Office Action has presented an argument of obviousness that cannot be maintained because: 1) the §103 rejection fails to include evidence of the alleged motivation to make the combination asserted in the Office Action; 2) the problems addressed by the cited prior art and the claimed invention are entirely different and thereby rebut any argument that the skilled artisan would be led to implement the modification as asserted; and 3) a §103 rejection cannot be maintained when the rejection proposes a modification that undermines the purpose of the main reference, as it does in this instance for the purpose of the *Korman* '357 reference.

With respect to the requisite evidence for the alleged motivation to make the combination asserted in the Office Action, a significant body of authoritative case law clearly indicates that such evidence must be found in the prior art. For example, *Ruiz v. A.B. Chance Co.*, 234 F.3 654, 57 U.S.P.Q.2d 1161 (Fed. Cir. 2000), indicates that the alleged motivation for combining

the references is to be suggested by the ***references*** ("Our court has provided [that the] motivation to combine may be found explicitly or implicitly: 1) in the ***prior art references*** themselves; 2) in the knowledge of those of ordinary skill in the art that certain ***references***, or disclosures in those references, are of special interest or importance in the field; or 3) from the nature of the problem to be solved, 'leading inventors to look to ***references*** relating to possible solutions to that problem.'"). The Office Action cannot simply assert that an important claim limitation (such as aluminum) can be replaced based on an unsupported argument that, perhaps for some other purpose and in some other environment, the claim limitation being replaced is not so important and therefore is interchangeable for an unspoken purpose. In this instance, the Office Action is completely silent on the purpose for interchanging aluminum and copper which, by itself should be taken as an acknowledgement that the evidence is lacking.

With respect to the problems addressed by the cited prior art and the claimed invention, the M.P.E.P. and case law fully support the notion in the statute that the claim must be considered "as a whole" (35 U.S.C. §103(a)) which contemplates the problems discovered, discussed, and addressed by Applicant's claimed invention. *See, e.g.*, M.P.E.P. §2141.02 which clearly indicates that discovering the source or cause of a problem is part of the "as a whole" inquiry; *see also In re Sponnoble*, 405 F.2d 578, 585, 160 U.S.P.Q. 237, 243 (CCPA 1969). In this instance, the Office Action has entirely ignored the problems discovered, discussed and addressed by Applicant's claimed invention and has also entirely ignored the problems being addressed by the prior art. As mentioned above and discussed more fully below, these problems being addressed by the prior art have nothing to do with the claimed invention and they cannot be disregarded when considering a modification to the prior art. Because of the lack of any such nexus in this regard, considering the claimed invention "as a whole" (as required by 35 U.S.C. §103(a)), the Examiner's argument that the skilled artisan would be led to implement the modification is clearly rebutted.

Finally, the §103 rejection must fail because no §103 rejection can be maintained when the asserted modification undermines purpose of main reference. *See, e.g., In re Gordon*, 733 F.2d 900, 221 U.S.P.Q. 1125 (Fed. Cir. 1984) (when the asserted modification undermines purpose of main reference, the prior art teaches away and the rejection must be withdrawn). As

discussed above, the Examiner's proposed modification undermines the purpose of the *Korman* '357 reference; therefore, the rejection cannot be maintained.

Turning now to the §112(1) and §112(2) rejections, claim 32 is hereby cancelled and the remaining rejections for both rejection types turn on whether the skilled artisan would recognize from the Specification that the claimed "single-layer plug" would not have the various interface problems/manifestations set forth in the rejected claims. Single-layer plugs that are made of aluminum inherently do not involve formation by two-step planarization (claim 28), intermediate-step CMP (claims 29 and 34), and grain boundaries formed by a two-step process (claim 31). Therefore, Applicant maintains the argument presented in the previous response filed on May 28, 2002 and incorporated herein, that the figures and specification support and fully correspond to these rejected claims.

Accordingly, Applicant submits that the invention is distinguishable from the asserted art and that each of the above rejections has been overcome.

In view of the above, Applicant submits that each of the claims is in condition for allowance. Reconsideration and withdrawal of the rejections, along with a favorable response, are earnestly requested.

Should there be any remaining issues that could be readily addressed over the telephone, and for any further correspondence, the Examiner is encouraged to contact the agent overseeing

prosecution of the above-referenced application: Mr. Peter Zawilski of Philips Corporation at (408) 617-4832

Respectfully submitted,

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Title Change for S/N 09/775,370

Please replace the title as indicated below.

SEMICONDUCTOR DEVICE COMPRISING ALUMINUM-BASED PLUGS BETWEEN FIRST AND SECOND METAL PORTIONS

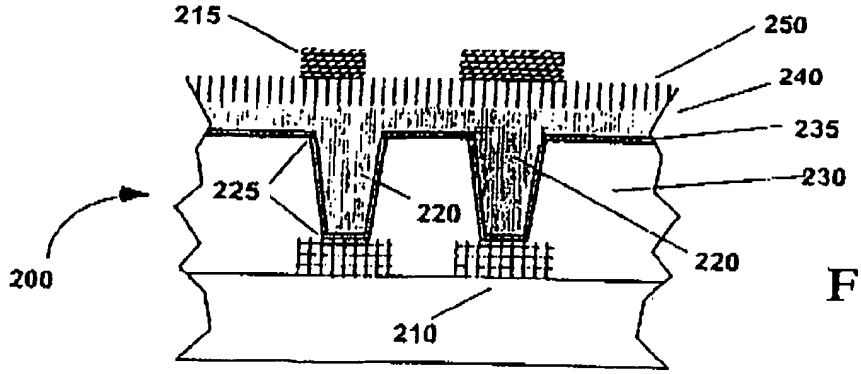

FIG. 2A

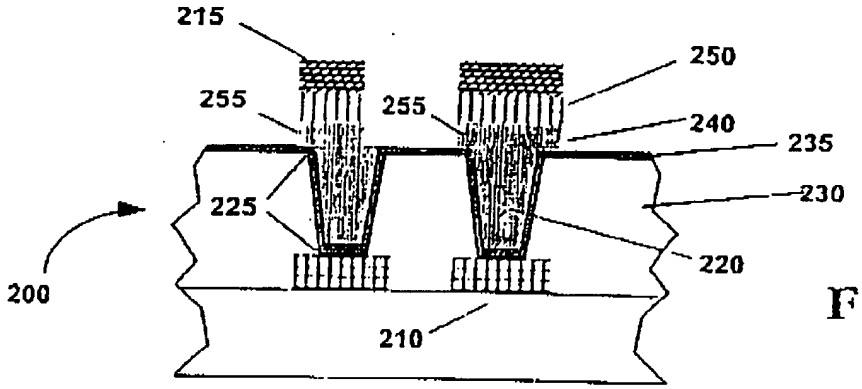

FIG. 2B

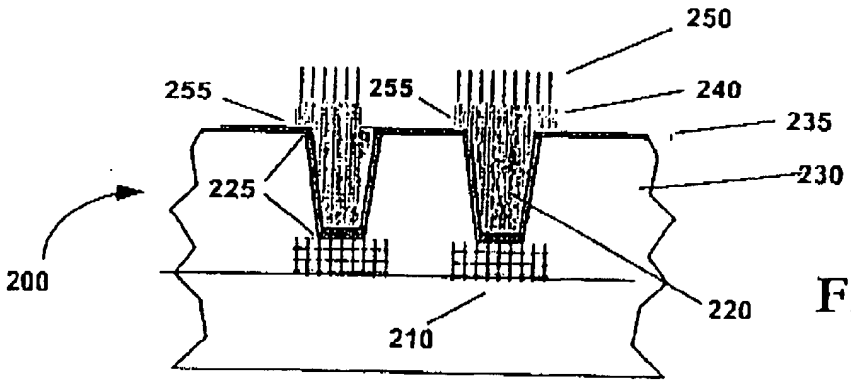

FIG. 2C

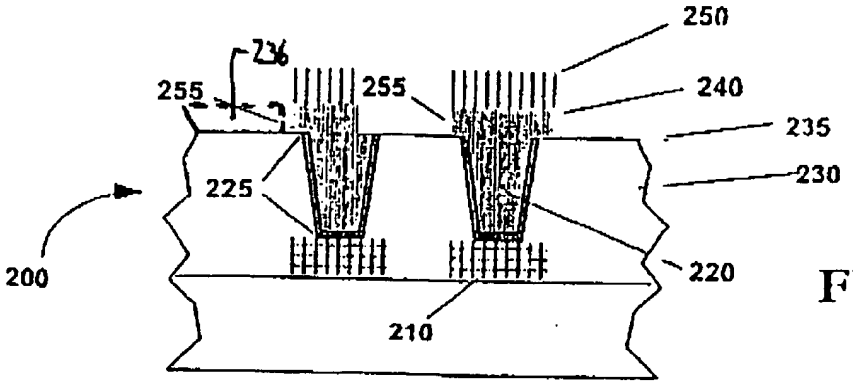

FIG. 2D